GLOSSARY

ABATEMENT	The reduction in degree of intensity of pollution.
ABSOLUTE PRESSURE	Pressure above zero pressure, the sum of the gage and atmospheric pressures.
ACTUAL CUBIC FOOT	A cubic foot referring to the actual temperature and pressure of the gas. Usually abbreviated ACF.
ACTUAL VOLUME	The volume of a gas at its actual temperature and pressure. In the U.S., this is normally expressed as actual cubic feet.
ACTUATING SIGNAL	A signal which causes a control element to function or position itself accordingly.
ADIABATIC TEMPERATURE	The theoretical temperature that would be attained by the products of combustion provided the entire chemical energy of the fuel, the sensible heat content of the fuel, and combustion air above the datum temperature were transferred to the products of combustion. This assumes: 1. Combustion is complete. 2. There is no heat loss. 3. There is no dissociation of the gaseous compounds. 4. Inert gases play no part in the reaction.
AERATION	To circulate oxygen through a substance.
AFTERBURNER	An air pollution control device that removes undesirable organic gases by incineration.
AFTERCOOLER	A device used for lowering the temperature of a fluid. Typically used on air compressors or to reduce the temperature of boiler blow-off discharge before it enters the building drain.
AGGLOMERATING	A caking characteristic of a coal.
AIR ATOMSIZING OIL BURNER	A burner for firing oil in which the oil is atomized by compressed air which is forced into and through one or more streams of oil, breaking the oil into a fine spray.
AIR BLAST	The flow of air at a high velocity, usually for a short period.
AIR-COOLED WALL	A refractory wall of hollow construction through which air passes.
AIR DEFICIENCY	Insufficient air in an air-fuel mixture to supply the oxygen theoretically required for complete combusion of the fuel.
AIR DRIED	Condition of coal after sample has been exposed to 85F to 95F air until weight is constant.
AIR-FUEL RATIO	The ratio of the weight, or volume of air to fuel.
AIR INFILTRATION	The leakage of air into a setting, furnace, boiler, or duct.
AIR MOISTURE	The water vapor suspended in the air.
AIR MONITORING	See Monitoring.
AIR POLLUTION	The presence of contaminant substances in the air that do not disperse properly and interfere with human health.
AIR PORT	An opening through which air passes.
AIR PREHEATER OR AIR HEATER	A heat exchanger that transfers heat from a high temperature medium such as hot gas, or steam, to an incoming air stream.
AIR-PUFF BLOWER	An automatically controlled soot blower removing ash, refuse, or soot from heat absorbing surfaces.
AIR PURGE	The removal of undesired matter by replacement with air.
AIR QUALITY CONTROL REGION	An area designated by the Federal Government in which communities share a common air pollution problem, sometimes involving several states.
AIR QUALITY STANDARDS	The level of pollutants prescribed by law that cannot be exceeded during a specified time in a defined area.
AIR RESISTANCE	The opposition offered to the passage of air through any flow path.
AIR VENT	A valved opening for venting air from the top of the highest drum of a boiler or pressure.

ALARM	A suitable horn, bell, light or other device which when operated will give notice of malfunction or off-normal condition.
ALLOWABLE WORKING PRESSURE	The maximum pressure for which the boiler was designed and constructed; the maximum gage pressure on a complete boiler and the basis for setting of the pressure relieving devices protecting the boiler.
AMBIENT AIR	The air that surrounds the equipment.
AMBIENT TEMPERATURE	The temperature of the air surrounding the equipment.
ANALYSIS, PROXIMATE	Analysis of a solid fuel determining moisture, volatile matter, fixed carbon and ash expressed as percentage of the total weight of sample.
ANALYSIS, ULTIMATE	Chemical analysis of a fuel determining carbon, hydrogen, sulfur, nitrogen, chlorine, oxygen, and ash as percentages of the total weight of sample.
ANTHRACITE	ASTM coal classification by rank: Dry fixed carbon 92% or more and less than 98%; and dry volatile matter 8% or less and more than 2% on a mineral- matter-free basis.
AQUIFER	An underground bed or layer of earth, gravel, or pourous stone that contains water.
AREA SOURCE	In air pollution, any small individual fuel combustion source, including vehicles. A more precise legal definition is available in Federal Regulations.
ARCH-FURNACE	A substantially horizontal structure extending into the furnace, to serve as a deflector of the gases.
AS-FIRED FUEL	Fuel in the condition as fed to the fuel burning equipment.
ASH	The incombustible solid matter in fuel.
ASH BED	A layer of refuse left on grates or deposited on a furnace floor after the fuel is burned.
ASH-FREE BASIS	The method of reporting fuel analysis whereby ash is deducted and other constituents are recalculated to total 100%.
ASH GATE	A gate or valve through which refuse is removed from an ash pit or soot hopper.
ASH SLUICE	A trench or channel used for transporting refuse from ash pits to a disposal point by means of water.
ASPECT RATIO	The ratio of width to depth in a rectangular duct or elbow. Used in calculating resistance to flow.
ASPIRATING AIR	Compressed air supplied at pressures sufficiently above furnace pressure to prevent flow of combustion gases from escaping the boiler.
ASPIRATING BURNER	A burner in which the fuel in a gaseous or finely divided form is burned in suspension, the air for combustion being supplied by bringing into contact with the fuel air drawn through one or more openings by the lower static pressure created by the velocity of the fuel stream.
ATMOSPHERE	The body of air surrounding the earth.
ATMOSPHERIC PRESSURE	The barometer reading of pressure exerted by the atmosphere; at sea level, 14.7 pounds per square inch or 29.92 inches of mercury.
ATOMIZER	sA device by means of which a liquid is reduced to a very fine spray.
ATTEMPERATOR	Apparatus for reducing and controlling the temperature of a superheated vapor or of a fluid. Also called Desuperheater.
AUTOMATIC CONTROLLER	A device which causes the difference between a measured property and its set point to diminish.
AUTOMATIC LIGHTER OR IGNITER	A means for starting ignition of fuel without manual intervention. Usually applied to liquid, gaseous or pulverized fuel (see Igniter).
AUXILIARY AIR	Additional air, either hot or cold, which may be introduced into the exhauster inlet or burner lines to increase the primary air at the burner.
AVAILABLE DRAFT	The draft which may be utilized to cause the flow of air for combustion or the flow of products of combustion.
AVAILABILITY FACTOR	The fraction of the time during which the unit is in operable condition.
AXIAL FAN	Consists of a propeller or disc wheel within a cylinder discharging the air parallel to the axis of the wheel.

BACKGROUND LEVEL	In air pollution, the level of pollutants present in ambient air from natural sources.
BACKING RING	A ring of steel or other material placed behind the welding groove when joining tubes or pipes by welding, to confine the weld metal.
BACHARACH NUMBER	See Smoke Spot Number.
BAFFLE	A plate or wall for deflecting gases or liquids.
BAG	1. A deep bulge in the bottom of the shell or furnace of a firetube boiler. 2. A single fabric filter unit in a baghouse.
BAGHOUSE	An air pollution abatement device used to trap particulates by filtering gas streams through large fabric bags usually made of glass fibers.
BALANCED DRAFT	The maintenance of a fixed value of draft in a furnace at all combustion rates by control of incoming air and outgoing products of combustion.
BANKING	Burning solid fuels on a grate at rates sufficient to maintain ignition only.
BANKING (LIVE)	Operating boilers at combustion rates just sufficient to maintain normal operating pressure under conditions of no load demand.
BARETUBE WALL	A furnace wall having bare tubes.
BAROMETRIC PRESSURE	Atmospheric pressure as determined by a barometer. Usually expressed in inches of mercury.
BASE LOAD	The term applied to that portion of a boiler plant load that is essentially constant for long periods.
BATTERY SETTING	A type setting in which two or more boilers share common division walls.
BEADED TUBE-END	The rounded end of a rolled tube when the tube metal is formed over against the sheet in which the tube is rolled.
BELLED TUBE-END	See Flared Tube-End.
BELLOWS SEAL	A seal in the shape of a bellows used to prevent air or gas leakage.
BIN SYSTEM	A system in which fuel is pulverized, stored in bins, and subsequently withdrawn through feeders to the burners in amounts sufficient to satisfy load demands.
BITUMINOUS COAL	ASTM coal classification by rank on a mineral- matter-free basis and with bed moisture only. 1. LOW VOLATILE: Dry fixed carbon 78% or more and less than 86%; and dry volatile matter 22% or less and more than 14%. 2. MEDIUM VOLATILE: Dry fixed carbon 69% or more and less than 78%; and dry volatile matter 22% or less and more than 31%. 3. HIGH VOLATILE (A): Dry fixed carbon less than 69% and dry volatile matter more than 31% Btu value equal to or greater than 14,000 moist, mineral- matter-free basis. 4. HIGH VOLATILE (B): Btu value 13,000 or more and less than 14,000 moist, mineral- matter-free basis. 5. HIGH VOLATILE (C): Btu value 11,000 or more and less than 13,000 moist, mineral-free basis commonly agglomerating, or 8,300 to 11,500 Btu agglomerating.
BLANK HEAD	A head, without a manhole, at the end of a boiler drum.
BLIND NIPPLE	A nipple, or a short piece of pipe or tube, closed at one end.
BLISTER	A raised area on the surface of solid metal produced by pressure thereon while the metal is hot and plastic due to overheating.
BLOCK	Usually a rectangular-shaped casting of metal or of high heat-conducting material made to fit closely on or cast to furnace side walls. Also a refractory shape used as a furnace lining and cooled by air.
BLOWBACK	The difference between the pressures at which a safety valve opens and closes, usually about 3 percent of the opening pressure.
BLOWDOWN VALVE	A valve generally used to continuously regulate concentration of solids in the boiler (not a drain valve).
BLOWER	A fan used to force air under pressure. Typically used to force air through a pulverizer or to force primary air through an oil or gas burner register.

BLOWHOLE — A local area in a burning fuel bed through which disproportionately large quantity of air passes.

BLOWOFF SEPARATOR — A vented and drained container equipped with internal baffles or an appratus for the purpose of separating moisture from flash steam as it passes through the vessel.

BLOW-OFF VALVE — A specially designed, manually operated, valve connected to the boiler for the purpose of reducing the concentration of solids in the boiler or for draining purposes.

BOILER — A closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum by the application of heat. The term does not include such facilities that are an integral part of a continuous processing unit but does include units supplying heating or vaporizing liquids other than water where these are separate from processing systems and are complete within themselves.

1. HIGH PRESSURE — A boiler furnishing steam at pressure in excess of 15 pounds per square inch or hot water at temperatures in excess of 250F or at pressures in excess of 160 pounds per square inch.
2. LOW-PRESSURE — A boiler furnishing hot water at pressures not exceeding 160 pounds per square inch or at temperatures not more than 250F or steam at pressures not more than 15 pounds per square inch.
3. HIGH-TEMPERATURE WATER — A water heating boiler operating at a pressure exceeding 160 psig or temperatures exceeding 250F.
4. WATERTUBE — A boiler in which the tubes contain water and steam, the heat being applied to the outside surface.
5. BENT TUBE — A watertube boiler consisting of two or more drums connected by tubes, practically all of which are bent near the ends to permit attachmen to the drum shell on radial lines.
6. HORIZONTAL — A watertube boiler in which the main bank of tubes are straight and on a slope of 5 to 15 degrees from the horizontal.
7. SECTIONAL HEADER — A horizontal boiler of the longitudinal or cross drum type, with the tube bank comprised of multiple parallel sections, each section made up of a front and rear header connected by one or more vertical rows of generating tubes and with the sections or groups of sections having a common steam drum.
8. BOX HEATER — A horizontal boiler of the longitudinal or cross drum type consisting of a front and rear inclined rectangular header connected by tubes. CROSS DRUM — A sectional header or box boiler in which the axis of the horizontal drum is at right angles to the center lines of the tubes in the main bank.
9. LONGITUDINAL DRUM — A sectional header or box header boiler in which the axis on the horizontal drum or drums is parallel to the tubes in a vertical plane.
10. LOW HEAD — A bent tube boiler having three drums with relatively short tubes in a vertical plane.
11. FIRETUBE — A boiler with straight tubes, which are surrounded by water and steam and through which the products of combustion pass.
12. HORIZONTAL RETURN TUBULAR — A firetube boiler cosisting of a shell, with tubes inside the shell attached to both end closures. The products of combustion pass under the bottom half of the shell and return through the tubes.
13. LOCOMOTIVE — A horizontal firetube boiler with an internal furnace the rear of which is a tube sheet directly attached to a shell containing tubes through which the products of combustion leave the furnace.

BOILER (Cont'd)	14. HORIZONTAL FIREBOX — A firetube boiler with an internal furnace the rear of which is a tube sheet directly attached to a shell containing tubes. The first — pass bank of tubes is connected between the furnace tube sheet and the rear head. The second — pass bank of tubes, passing over the crown sheet, is connected between the front and rear end closures. 15. REFRACTORY LINED FIREBOX — A horizontal firetube boiler, the front portion of which sets over a refractory or water-cooled refractory furnace, the rear of the boiler shell having an integral or separately connected section containing the first-pass tubes through which the products of combustion leave the furnace, then returning through the second- pass upper bank of tubes. 16. VERTICAL — A firetube boiler consisting of a cylindrical shell, with tubes connected between the top head and the tube sheet which forms the top of the internal furnace. The products of combustion pass from the furnace directly through the vertical tubes. 17. SUBMERGED VERTICAL — The same as the vertical type above, except that by use of a water leg construction as part of the upper tube sheet, it is possible to carry the waterline at a point above the top ends of the tubes. 18. SCOTCH BOILER — A cylindrical steel shell with one or more cylindrical internal steel furnaces located generally in the lower potion and with a bank or banks (passes) of tubes attached to both end closures. In Stationary Service, the boilers are either of the Dry-Back, or Wet-Back (see Boiler Dry-Back and Boiler Wet-Back). In Marine Service, the boilers are generally of the Wet-Back Type.
BOILER BLOW-OFF PIPING	The piping connections from the boiler to the blow-off valves.
BOILER BLOW-OFF TANK	A vented and drained container into which water is discharged above atmospheric pressure from a boiler blow-off line. Also called Flash Tank.
BOILER CONVECTION BANK	A group of two or more rows of tubes forming part of a water boiler circulatory system and to which heat is transmitted mainly by convection from the products of combustion.
BOILER DRY-BACK	The baffle provided in a firetube boiler joining the furnace to the second-pass. Constructed to be separate from the pressure vessel and constructed of heat resistant material, (generally refratory and insulating material).
BOILER EFFICIENCY	The ratio of the net energy output of the boiler fluid divided by the input of the primary energy source(s).
BOILER HORSEPOWER	The evaporation of 34½ pounds of water per hour from a temperature of 212F into dry saturated steam at the same temperature. Equivalent to 33,472 Btu/hr.
BOILER WET-BACK	A completed water-cooled baffle provided in a firetube boiler or water leg construction covering the rear end of the furnace and tubes. The products of combustion leaving the furnace are turned in this area and enter the tube bank.
BOND	A retaining or holding high-temperature cement for making a joint between brick or adjacent courses of brick.
BONE COAL	Coal from that part of a seam which has a very high ash content. In connection with anthracite, any material which has between 40% and 75% fixed carbon.
BOOSTER FAN	A device for increasing the pressure of flow of a gas (see Blower).
BOSS	A raised portion of metal of small area and limited thickness on flat or curved metal surfaces.
BOTTOM AIR ADMISSION	A method of introducing air to a chain or traveling grate stoker under the stoker.
BREECHING	A duct for the transport of the products of combustion between parts of a steam generating unit or to the stack.
BRIDGEWALL	A wall in a furnace over which the products of combustion pass.
BRIDGING	The accumulation of non-combustible matter and slag partially or completely blocking spaces or orifices between heat absorbing tubes.

BRITISH THERMAL UNIT	The mean British Thermal Unit is 1/180 of the heat required to raise the temperature of 1 pound of water from 32F to 212F at a constant atmospheric pressure. It is about equal to the quantity of heat required to raise 1 pound of water 1 degree F (abbreviated Btu).
BROKEN COAL	Anthracite coal size — through 4⅜", over 3¼" round mesh screen.
BROWN COAL	A former coal classification according to rank now included in Lignite B.
BUCKSTAY SPACER	A spacer for separating a pair of channels which are used as a buckstay.
BUCKWHEAT	Anthracite coal size: 1. Number 1 (Buckwheat) — through 9/16", over 5/16" round mesh screen. 2. Number 2 (Rice) — through 5/15", over 3/16" round mesh screen. 3. Number 3 (Barley) — through 3/16", over 3/32" round mesh screen. 4. Numbver 4 — through 3/32", over 3/64" round mesh screen. 5. Number 5 — through 3/64", round mesh screen.
BULGE	A local distortion or outward swelling caused by internal pressure on a tube wall or boiler shell while overheated. Also applied to similar distortion of a cylindrical furnace due to external pressure when overheated provided the distortion is of a degree that can be driven back.
BUMP	A raised or flattened portion of a boiler drum head or shell formed by farbrication, generally used for nozzle or pipe attachments.
BUNKER C OIL	Residual fuel oil (No. 6 fuel oil) of high viscosity commonly used in marine and stationary steam power plants.
BURNER	A device for the introduction of fuel and air into a furnace at the desired velocities, turbulence and concentration to establish and maintain proper ignition and combustion of the fuel. 1. AUTOMATIC BURNER — A burner that stops and starts automatically. 2. BURNER, AUTOMATICALLY IGNITED — One where main burner fuel is automatically turned on and ignited. 3. BURNER, MANUALLY IGNITED — One where fuel to the main burner is turned on only by hand and ignited under supervision. 4. BURNER, FORCED DRAFT — A burner where air for combustion is supplied above atmospheric pressure. 5. BURNER, NATURAL DRAFT TYPE — A burner which depends principally upon the natural draft to induce into the burner the air required for combustion.
BURNER WINDBOX	A Plenum chamber around a burner in which air pressure is maintained to ensure proper distribution and discharge of secondary air.
BURNER WINDBOX PRESSURE	The air pressure maintained in the windbox or plenum chamber.
BUTTSTRAP	A narrow strip of boiler plate overlapping the joint of two butted plates, used for connecting by riveting.
BYPASS	A passage for a fluid, permitting a portion or all of the fluid to flow around certain heat absorbing surfaces over which it would normally pass.
CAKING	Property of certain coals to become plastic when heated and form large masses of coke.
CALORIFIC VALUE	The number of heat units liberated per unit of a fuel burned in a calorimeter under prescribed conditions.
CALORIMETER	Apparatus for determining the calorific value of a fuel.
CAPACITY	The manufacturers stated output rate over a period of time for which the boiler is designed to operate.
CAPACITY FACTOR	The total outpout over a period of time divided by the product of the boiler capacity and tehe time period.
CARBON	An element. The principal combustible constituent of most fuels.
CARBON CONVERSION EFFICIENCY	An indictor of the degree to which the fuel carbon compounds are oxidized to CO_2.
CARBONIZATION	The process of converting coal to carbon by removing other ingredients.

CARBON LOSS	The loss representing the unliberated thermal energy occasioned by failure to oxidize some of the carbon in the fuel.
CARBON RESIDUE	The carbon residue of a fuel is a measure of the carbonaceous material left after all the volatile compounds are vaporized in the absence of air.
CASING	A covering of sheets of metal or other material such as fire resistant composition board used to enclose all or a portion of a steam generating unit.
CENTRIFUGAL COLLECTOR	A mechanical system using centrifugal force to remove aerosols from a gas stream or to de-water sludge.
CENTRIFUGAL FAN	A type of fan using a rotor or wheel within a scroll type housing and discharging the air at a right angle to the axis of the wheel.
CHAIN GRATE STOKER	A stoker which has a moving endless chain as as grate surface, onto which coal is fed directly from a hopper.
CHECKER WORK	An arrangement of alternately spaced brick in a furnace with openings through which air or gas flows.
CHEMICAL FEED PIPE	A pipe inside a boiler drum through which chemicals for treating the boiler water are introduced.
CHIMNEY LINING	The material which forms the inner surface of the chimney.
CINDER	Particles of partially burned fuel from which volatile gases have been drive off, which are carried from the furnace by the products of combustion.
CIRCULAR BURNER	A liquid, gaseous, or pulverized fuel burner having a circular opening through the furnace wall.
CIRCULATOR	A pipe or tube to pass steam or water between boiler drums or headers. Also used to apply to tubes connecting headers of horizontal watertube boilers with drums.
CLASS	Rank of coal.
CLEANOUT DOOR	A door placed so the accumulated refuse may be removed from a boiler setting, flue or chimney.
CLINKER	A hard congealed mass of fuel matter fused in the furnace, usually slag.
CLINKER CHILL	Any water cooled wall surface, the major portion of which is in contact with the edges of the fuel bed.
CLINKERING	The formation of clinkers.
COAL	Solid hydrocarbon fuel formed by ancient decomposition of woody substance under conditions of heat and pressure.
COGENERATION	The production of steam (or hot water) and/or electricity for use by multiple users generated from a single source.
COKING	The conversion by heating carbonaceous fuel, particularly certain bituminous coals, in the absence or near absence of air to a coherent, firm, cellular carbon product known as coke.
COKING PLATE	A plate adjacent to a grate through which no air passes and on which coal is placed for distilling the volatiles before the coal is moved onto the grate.
COMBUSTIBLE	The heat producing constituents of a fuel.
COMBUSTIBLE IN REFUSE	Combustible matter in the solid refuse resulting from the incomplete combustion of fuel. It may occur in the flue dust discharge from the stack or collected in hoppers, as well as in ash-pit refuse.
COMBUSTIBLE LOSS	The loss representing the unliberated thermal energy occasioned by failure to oxidize completely some of the combustible matter in the fuel.
COMBUSTION	The rapid chemical combination of oxygen with the combustible elements of a fuel resulting in the production of heat.
COMBUSTION CHAMBER	The space in which combustion takes place. Also called a furnace.
COMBUSTION EFFICIENCY	A measure of the completeness of oxidation of all fuel compounds. It is usually quantified as the ratio of actual heat release by combustion to the maximum heat of combustion available.

COMBUSTION (FLAME) SAFEGUARD	A system for sensing the presence or absence of flame and indicating, alarming, or initiating control action.
COMPARTMENT	One of two or more air chambers in a windbox or under the stoker from which air can be passed in controlled quantities.
COMPLETE COMBUSTION	The complete oxidation of all the combustible constituents of a fuel.
CONDUCTION	The transmission of heat through and by means of matter unaccompanied by any obvious motion of the matter.
CONDUCTIVITY	The amount of heat (Btu) transmitted in one hour through one square foot of a homogeneous material 1 inch thick for a difference in temperature of 1°F between the two surfaces of the material.
CONSTANT IGNITION	A pilot, usually gas, that remains lighted at full volume whether the main burner is in operation or not.
CONTINUOUS BLOWDOWN	The uninterrupted removal of concentrated boiler water from a boiler to control total solids concentration in the remaining water.
CONTROL	Any manual or automatic device for the regulation of a machine as a boiler to keep it at normal operation. If automatic, the device is motivated by variations in temperature, pressure, water level, time, light, or other influences.
CONTROL ELEMENT	A device (usually a valve or damper) which produces a physical change according to an actuating signal.
CONTROL, LIMIT	An automatic safety contgrol responsive to changes in liquid level, pressure, or temperature or position for limiting the operation of the controlled equipment.
CONTROL, LIMIT	An automatic safety control responsive to changes in liquid level, pressure, or temperature or position for limiting the operation of the controlled equipment.
CONTROL, SAFETY	Control (including relays, switches, and other auxiliary equipment used in conjunction therewith to form a safety control system) which are intended to prevent unsafe operation of the controlled equipment.
CONTROL UNIT	A device designed to regulate the fuel, air, water, or electerical supply to the controlled equipment. It may be automatic, semi-automatic or manual.
CONTROL VALVE	A valve used to control tehe flow of air, oil, or gas.
CONVECTION	The transmission of heat by the circulation of a liquid or a gas such as air. Convection may be natural or forced.
CORNER FIRING	A method of firing liquid, gaseous, or pulverized fuel in which the burners are located in the corners of the furnace. Also called tangential firing.
CORROSION	The wasting away of metals due to chemical action in a boiler usually caused by the presence of oxygen, carbon dioxide, or an acid.
CRACKING	The thermal decomposition of complex hydrocarbons into simpler compounds or elements.
CRICKET	A wedge-shaped member of refractory or other construction used to subdivide a channel into hopper-shaped pockets.
CRITERIA	The standards EPA has established for certain pollutants, which not only limit the concentration, but also set a limit to the number of violations per year.
CROWN SHEET	In a firebox boiler, the plate forming the top of the furnace.
CROSS LIMITING	A feature of some full metering systems which, by means of high- low select controls, prevents fuel flow from exceeding air flow under conditions of load changes or flow changes of either air or fuel.
CRUDE OIL	Unrefined petroleum.
CRUSHER	A Machine to reduce lumps of solid fuel to a desired maximum size.
CYCLONE	A device which uses centrifugal action for separation of materials of different densities.
CYCLONE COLLECTOR	A device that uses centrifugal force to pull large particles from polluted air.
DAMPER	A device for introducing a variable resistance for regulating the volumetric flow of gas or air. 1. Butterfly Type — A single blade damper pivoted about its center.

DAMPER (Cont'd)	2. Curtain Type — A damper, composed of flexible material, moving in a vertical plane as it is rolled. 3. Flap Tpye — A damper consisting of one or more blades each pivoted about one edge. 4. Louvre Type — A damper consisting of several blades each pivoted about its center and linked together for simultaneous operation. 5. Slide Type — A damper consisting of a single blade which moves substantially normal to the flow.
DEAD PLATE	A grate or plate through which no air passes (see Coking Plate).
DEAERATION	Removal of air and gases from boiler feedwater prior to its introduction to a boiler.
DEFLECTOR	A device for changing direction of a stream of air or of a mixture of pulverized fuel and air.
DEGASIFICATION	Removal of air and gases from boiler feedwater prior to its introduction to a boiler.
DEGREE OF SUPERHEAT	The number of degrees between steam temperature and saturated temperature corresponding to the steam pressure.
DELAYED COMBUSTION	A continuation of combustion beyond the furnace (see also Secondary Combustion).
DEMINERALIZER	An ion exchange device used to remove solids from water.
DERIVATIVE (RATE) CONTROLLER	A controller in which the output signal level is directly proportional to the rate of change of the error. This type of control is rarely used without integral and/or proportional control modes. Derivative control tends to be hypersensitive to noise and other high-frequency disturbances.
DESIGN LOAD	The load for which steam generating unit is designed, usually considered the maximum load to be carried.
DESIGN PRESSURE	The pressure used in the design of a boiler for the purpose of determining the minimum permissible thickness or physical characteristics of the different parts of the boiler.
DESIGN STEAM TEMPERATURE	The temperature of steam for which a boiler, superheater or reheater is designed.
DE-SLAG	The removal of slag which has adhered to heat absorbing surfaces.
DESUPERHEATER	See Attemperator.
DEW POINT	The temperature at which condensation starts.
DIAGONAL STAY	A brace used in firetube boilers between a flat head or tube sheet and the shell.
DIAPHRAGM	A partition of metal or other material placed in a header, duct or pipe to separate portions thereof.
DIFFERENTIAL	(on/off control) The difference between "cut-in" and "cut-out" points.
DIFFUSER	A device used to distribute air flow within the burner to promote stable ignitions and/or enhance fuel/air mixing. Also called impeller.
DIRECT-FIRED CIRCULATING SYSTEM	A system in which fuel is pulverized in proportion to the load demand and conveyed directly from the pulverizers to the burners.
DIGITAL CONTROL	A control system that utilizes a microprocessor or computer to process and determine control decisions. Analog signals are converted to digital words, processed, and then converted to analog signals to ultimately be transmitted to final control elements.
DISSOCIATION	The process by which a chemical compound breaks down into simpler constituents.
DISSOLVED GASES	Gass which are in solution in water.
DISSOLVED SOLIDS	Those solids in water which are in solution.
DISTILLATE OIL	Light fraction of oil which has been separated from crude oil by fractional distillation.
DISTILLATION ZONE	The region, in a solid fuel bed, in which volatile constituents of the fuel are vaporized.
DISTILLED WATER	Water produced by vaporization and condensation with a resulting higher purity.
DISTRIBUTED DIGITAL CONTROL	A control system, characterized by the integration of a central digital control area with one or more remote digital control areas that are partially dedicated to perform specified control, within their realm of operation. Specified levels of communication and operation may be controlled from the central area or any

DISTRIBUTED DIGITAL CONTROL (Cont'd)	remote area. The concept of distributed digital control is to prevent complete system failure due to a failure in any one area.
DOUBLE INCLINED GRATE	A grate consisting of two parts, so placed and inclined to form a Figure V.
DOWNCOMER	A tube or pipe in a boiler or waterwall circulating system through which fluid flows downward. See Supply Tube.
DRAFT	The difference between atmospheric pressure and some lower pressure existing in the furnace or gas passages of steam generating unit.
DRAFT CONTROL, BAROMETRIC	A device that controls draft by means of a balanced damper which bleeds air into the breeching on changes of pressure to maintain a steady draft.
DRAFT DIFFERENTIAL	The difference in static pressure between two points in a system.
DRAFT CAGE	A device for measuring draft, usually in inches of water.
DRAFT LOSS	The drop in the static pressure of a gas between two points in a system, both of which are below atmospheric pressure, and caused by resistance to flow.
DRAFT REGULATOR	A device which functions to maintain a desired draft in the appliance by automatically controlling the chimney draft to the desired value.
DRAG PLATE	A Plate beneath a traveling or chain grate stoker used to support the returning grates.
DRAG SEAL	In a chain grate stoker the hinged plate resting against the returning chain and used to seal the air compartments.
DRAIN	A valved connection at the lowest point of the boiler or piping system for the removal of all water.
DRIER	An apparatus for the removal of part or all of the water or moisture from fuel or air.
DRUM	A cylindrical shell closed at both ends designed to withstand internal pressure.
DRUM BAFFLE	A Plate or series of plates or screens placed within a drum to divert or change the direction of the flow of water or water and steam.
DRUM HEAD	A Plate closing the end of a boiler drum or shell.
DRUM INTERNALS	All apparatus within a drum.
DRUM OPERATING PRESSURE	The pressure of the steam maintained in the steam drum or steam-and-water drum of a boiler in operation.
DRY AIR	Air with which no water vapor is mixed. This term is used comparatively, since in nature there is always some water vapor included in air, and such water vapor, being a gas, is dry.
DRY ASH	Non-combustible matter in the solid state, usually in granular dust form.
DRY, ASH FREE BASIS	The method of reporting fuel analysis with ash and moisture eliminated and remaining constituents recalculated to total 100%.
DRY-BULB TEMPERATURE	The temperature of the air indicated by thermometer not affected by the water vapor content of the air.
DRY, FUEL BASIS	The method of reporting fuel analysis with moisture eliminated and other constituents recalculated to total 100%.
DRY GAS	Gas containing no water vapor.
DRY GAS LOSS	The loss representing the difference between the heat content of the dry exhaust gases and their heat content at the temperature of ambient air.
DRY LIMESTONE PROCESS	An air pollution control method that uses limestone to absorb the sulfur oxides in furnaces and stack gases.
DRY, MINERAL-MATTER-FREE BASIS	The method of reporting fuel analysis with moisture and ash, plus other mineral matter eliminated and remaining constituents recalculated to total 100%.
DRY STEAM	Steam containing no moisture. Commercially dry steam is usually said to contain not more than one half of one percent moisture.
DUCT	A passage for air or gas flow.
DUMP GRATE STOKER	One equipped with movable ash trays, or grates, by means of which the ash can be discharged at any desirable interval.

DUMP PLATE	An ash supporting plate from which ashes may be discharged by rotation from one side of the plate.
DUST	Fine grain particles light enough to be suspended in air.
DUTCH OVEN	A furnace that extends forward of the wall of a boiler setting. It is usually of refractory construction with a low roof, although in some cases the roof and side walls are water cooled.
ECONOMIZER	A heat recovery device designed to transfer heat from the products of combustion to boiler feedwater.
EJECTOR	A device which utilizes the kinetic energy in a jet of water or other fluid to remove a fluid or fluent material from tanks or hoppers.
ELECTRIC BOILER	A boiler in which electric heating means serve as the source of heat.
ELECTRONIC CONTROL	A control system which primarily uses electronic signals and solid state control devices.
ELECTROSTATIC PRECIPITATOR	An air pollution control device that imparts an electrical charge to particles in a gas stream causing them to collect on an electrode.
EMBRITTLEMENT CRACKING	A form of metal failure that occurs in steam boilers at riveted joints and at tube ends, the cracking being predominantly intercrystalline in nature.
EMISSION FACTOR	The relationship between the amount of pollution produced and the amount of fuel burned or raw material processed.
EMISSION INVENTORY	A listing, by source, of the amounts of air pollutants discharged into the atmosphere of a community daily. It is used to establish emission standards.
EMISSION STANDARD	The maximum amount of discharge legally allowed from a single source, mobile or stationary.
ENTRAINMENT	The conveying of particles of water or solids from the boiler water by the steam.
ENVIRONMENT	The sum of all external conditions affecting the life, development, and survival of an organism.
ENVIRONMENTAL IMPACT STATEMENT	A document required of Federal Agencies by the National Environmental Policy Act for major projects or legislative proposals. They are used in making decisions about the positive and negative effects of the undertaking, and list alternatives.
E/P TRANSDUCER	A transducer used to convert a voltage signal into a pneumatic signal.
EQUALIZER	Connections between parts of a boiler to equalize pressures.
EROSION	The wearing away of refractory or of metal parts, typically by the action of slag or fly ash.
ERROR	The difference between a measured property and its setpoint. This error calculation is usually an integral part of an automatic controller.
EVAPORATED MAKE-UP	Distilled water used to supplement returned condensate for boiler feedwater.
EVAPORATION RATE	The number of pounds of water evaporated in a unit of time.
EVASE STACK	An expanding connection on the outlet of a fan or in an air flow passage for the purpose of converting kinetic energy to potential energy, i.e., velocity pressure into static pressure.
EXCESS AIR	Air supplied for combustion in excess of that theoretically required for complete oxidation.
EXHAUSTER	A fan used to withdraw air or gases under suction.
EXHAUST STEAM	Steam discharged from a prime mover.
EXPANDED JOINT	The pressure tight joint formed by enlarging a tube end in a tube seat.
EXPANSION JOINT	A Joint to permit movement due to expansion without undue stress.
EXPLOSION	Uncontrolled combustion which proceeds so rapidly that a high pressure is generated suddenly.
EXPLOSION DOOR	A door in a furnace or boiler setting designed to be opened by predetermined gas pressures.
EXTENDED SURFACE	Heating surface in the form of fins, rings, or studs, added to heat absorbing elements.
EXTERNAL TREATMENT	Treatment of boiler feedwater prior to its introduction into the boiler.

FAN	A Machine consisting of a rotor and housing for moving air or gases at relatively low pressure differentials.
FEEDBACK	A signal produced by a measuring device which is proportional to the magnitude of a controlled variable or position of a control element. When combined with a set point signal, the required amount of control of a variable is indicated and serves as an input to an automatic controller.
FEED PIPE	A Pipe through which water is conducted into a boiler.
FEEDWATER	Water introduced into a boiler during operation. It includes make-up and return condensate.
FEEDWATER TREATMENT	The treatment of boiler feedwater by the addition of chemicals to prevent the formation of scale or eliminate other objectionable characteristics.
FERRULE	A short metallic ring rolled into a tube hole to decrease in diameter or rolled inside of a rolled tube end. Also a short metallic ring for making up handhole joints.
FILTER	Porous material through which fluids or fluid-and-solid mixtures are passed to separate matter held in suspension.
FILTRATION	Removing particles of solid materials from fluids.
FIN	Usually a strip of steel welded longitudinally or circumferentially to a tube.
FINENESS	The percentage by weight of a standard sample of a pulverized material which passes through a standard screen of specified mesh when subjected to a prescribed sampling and screening procedure (ASTM D 197).
FINES	Sizes below a specific range.
FIN TUBE	A tube with one or more fins.
FIN TUBE WALL	Spaced waterwall tubes on which flat metal extensions are welded in as plane parallel to the wall.
FIREBOX	The equivalent of a furnace. A term usually used for the furnaces of locomotive and similar types of boilers.
FIRE CRACK	A crack starting on the heated side of a tube, shell, or header resulting from excessive temperature stresses.
FIRED PRESSURE VESSEL	A pressure vessel in which steam or hot water is generated by the application of heat resulting from the combustion of fuel.
FIRE TUBE	A tube in a boiler having water on the outside and carrying the products of combustion on the inside.
FIRING DOOR	A door in a furnace through which coal or other solid fuel is introduced into the furnace.
FIRING RATE CONTROL	A pressure or temperature flow controller which controls the firing rate of a burner according to the deviation from pressure or temperature set point.
FIXED ASH	The portion of the ash derived from the original vegetation including all intimately contained minerals.
FIXED CARBON	A Component of the proximate analysis of a solid fuel. The carbonaceous residue less the ash remaining in the test container after the volatile matter has been driven off.
FIXED GRATE	A grate which does not have movement.
FLAME DETECTOR	A device which indicates if fuel is burning or if ignition has been lost. The indication may be transmitted to a signal or to a control system.
FLAME FORMING	The technique of shaping the geometry of a flame.
FLAME IMPINGEMENT	The substantially continuous contact upon a surface by flame which results in formation of hard carbonaceous deposits and which may result in localized incomplete combustion. Flame impingement is a condition of firing which may cause failure and/or excessive maintenance of combustion chamber wall surfaces.
FALMMABILITY	Susceptability to combustion.
FLAMMABILITY LIMITS	The limiting (upper & lower) homogeneous composition of a combustible mixture of gas and air beyond which the mixture will not ignite and continue to burn. The lower limit represents the smallest proportion of gas in air that can burn

FLAMMABILITY LIMITS (Cont'd)	without the continuous application of heat. The higher limit represents the largest proportion of gas in air that can burn without the continuous application of heat.
FLARED TUBE-END	The projecting end of a rolled tube which is expanded or rolled to a conical shape.
FLASHING	Steam produced by discharging water at saturation temperature into a region of lower pressure.
FLASH POINT	The flash point of a liquid is an indication of the maximum temperature at which it can be stored and handled without serious fire hazard.
FLASH TANK	See Boiler Blow-Off Tank.
FLUE	A passage for products of combustion.
FLUE DUST	The particles of gas-borne solid matter carried in the products of combustion.
FLUE GAS	The gaseous products of combustion in the flue to the stack.
FLUE GAS RECIRCULATION	The reintroduction of part of the combustion gas at a point upstream of the removal point in the furnace for the purpose of controlling steam temperature or for NOx control.
FLULIDIZED BED COMBUSTION	A process where a fuel is burned in a bed of granulated particles which are maintained in a mobile suspension by the forward flow of air and combustion products.
FLY ASH	Suspended ash particles carried in the flue gas.
FLY ASH COLLECTEOR	A device designed to remove fly ash in dry form from the flue gas.
FOAMING	The continuous formation of bubbles which have sufficiently high surface tension to remain as bubbles beyond the disengaging surface.
FORCED DRAFT FAN	A fan supplying air under pressure to the fuel burning equipment.
FORCED DRAFT STOKER	A stoker in which the flow of air through the grate is caused by a pressure produced by mechanical means.
FOULING	The accumulation of solid matter in gas passages or on heat absorbing surfaces which results in undesirable restrictions to the flow of gas or heat.
FREE MOISTURE	See Surface Moisture.
FRIABILITY	The tendency of a coal to crumble or break into small pieces.
FRONT DISCHARGE STOKER	A stoker so arranged that refuse is discharged from the grate surface at the same end as the coal feed.
FUEL	A substance contining combustible matter, and used for generating heat.
FUEL-AIR RATIO	The ratio of the weight or volume of fuel to air.
FUEL BED	Layer of burning fuel on a furnace grate.
FUEL BED RESISTANCE	The static pressure differential across a fuel bed.
FUEL OIL	Any hydrocarbon oil as defined by ASTM D 396.
FUEL OIL GRADES:	1. GRADE NO. 1 is a light distillate intended for use in burners of the vaporizing type in which the oil is converted to a vapor by contact with a heated surface or by radiation. High volatility is necessary to ensure that evaporation proceeds with a minimum of residue. 2. GRADE NO. 2 is a heavier distillate than Grade No. 1. It is intended for use in atomizing type burners which spray the oil into a combustion chamber where the tiny droplets burn while in suspension. This grade of oil is used in most domestic burners and in many medium capacity commercial-industrial burners where its ease of handling and ready availability sometimes justify its higher cost over the residual fuels. 3. GRADE NO. 4 (Light) is usually residual but it sometimes is a heavy distillate. It is intended for use both in pressure-atomizing commercial-industrial burners not requiring higher cost distillates and in burners equipped to atomize oils of higher viscosity. It is permissible viscosity range allows it to be pumped and atomized at relatively low storage temperatures. 4. GRADE NO. 4 is usually a light residual, but it is a heavy distillate. It is intended for use in burners equipped with devices that atomize oils of higher viscosity than domestic burners can handle. Its permissible viscosity range allows

FUEL OIL GRADES (Cont'd)	it to be pumped and atomized at relatively low storage temperatures. Thus, in all but extremely cold weather it requiresl no preheating for handling. 5. GRADE NO. 5 (Light) is residual fuel of intermediate viscosity for burners capable of handling fuel more viscous than Grade No. 4 without preheating. Preheating may be necessary in some types of equipment for burning and in colder climates for handling. 6. GRADE NO. 5 (Heavy) is a residual fuel more viscous than Grade No. 5 (light) and is intended for use in similar service. Preheating may be necessary in some types of equipment for burning and in colder climates for handling. 7. GRADE NO. 6, sometimes referred to as "Bunker C", is a high-viscosity oil used mostly in commercial and industrial heating. It requires preheating in the storage tank to permit pumping, and additional preheating at the burner to permit atomizing. The extra equipment and maintenance required to handle this fuel usually preclude its use in small installations.
FULL METERING	Combustion control system in which air to fuel ratios are maintained by measuring both air and fuel with a flow measuring device. Full metering systems can contain many other features such as cross limiting or oxygen trim.
FURNACE	See Combustion Chamber.
FURNACE DRAFT	The draft in a furnace, measured at a point immediately in front of the furnace outlet.
FURNACE LIBERATION RATE	The total quantity of thermal energy above a fixed datum introduced into a furnace by the fuel, considered to be the product of the hourly fuel rate, and its high heat value, divided by furnace volume, expressed in Btu per hour per cubic foot of furnace volume.
FURNACE RELEASE RATE	The heat available per square foot of heat absorbing surface in the furnace. Tha surface is the projected area of tubes, and extended metallic surfaces on the furnace side including walls, floor, roof, partition walls, and platens and the area of the plane of the furnace exit which is defined as the entrance to the convection tube bank.
FURNACE SLAG SCREEN	A screen formed by one or more rows of tubes arranged across a furnace gas outlet, serving to create an ash cooling zone for the particles suspended in the products of combustion leaving the furnace.
FURNACE VOLUME	The cubic contents of the furnace or combustion chamber.
FUSED SLAG	Slag which has coalesced into a homogenous solid mass by fusing.
FUSIBLE PLUG	A hollowed threaded plug having the hollowed portion filled with a low melting point material, usually located at the lowest permissible water level.
FUSIBILITY	Property of slag to fuse and coalesce into a homogeneous mass.
FUSION	The melting of a solid material such as ash.
GAGE COCK	A valve attached to a water column or drum for checking water level.
GAGE GLASS	The transparent part of a water gage assembly connected directly or through a water column to the boiler, below and above the water line, to indicate the water level in the boiler.
GAGE PRESSURE	The pressure above atmospheric pressure.
GAG, SAFETY VALVE	A clamp designed to prevent a safety valve from lifting while applying a hydrostatic test at higher pressure than the safety valve setting.
GAS ANALYSIS	The determination of the constituents of a gaseous mixture.
GAS BURNER	A burner for use with gaseous fuel.
GASIFICATION	The process of converting solid or liquid fuel into a gaseous fuel such as the gasification of coal.
GAS RING	A circular device with multiple openings or orifices arranged to admit or distribute gaseous fuels into a burner throat.
GENERATING TUBE	A tube in which steam is generated.
GRADE	Coal classification according to quality.

GRAIN LOADING	The rate at which particles are emitted from a pollution source; measurement is made by the number of grains per cubic foot of gas emitted. Also called Particulate Loading.
GRANULAR ASH	Small particles of dry ash.
GRATE	The surface on which fuel is supported and burned, and through which air is passed for combustion.
GRATE BARS	Those parts of the fuel supporting surface arranged to admit air for combustion.
GRAVITY	1. Weight index of fuels: liquid petroleum products expressed either as specific or API (American Petroleum Institute) gravity. 2. Weight index of gaseous fuels as specific gravity related to air under specific conditions. 3. Weight index of solid fuels as specific gravity related to water under specific conditions.
GROOVED TUBE SEAT	A tube seat having one or more shallow grooves into which the tube may be forced by the expander.
GROUP	A sub-classification of coal by rank.
HAND AUTO STATION (H/A STATION)	A device for routing a control signal to a final control element. The signal can be from a control system (auto position) or be entered manually to any desired level (manual position).
HAND FIRED GRATE	A grate on which fuel is placed manually, usually by means of a shovel.
HANDHOLE	An opening in a pressure part for access, usually not exceeding 6" in longest dimension.
HANDHOLE COVER	A Handhole closure.
HAND LANCE	A manually manipulated length of pipe carrying air, steam, or water for blowing ash and slag accumulations from heat absorbing surfaces.
HARDNESS	A measure of the amount of calcium and magnesium salts in a boiler water. Usually expressed as grains per gallon or ppm as $CaCO_2$.
HARD WATER	Water which contains calcium or magnesium in an amount which requires an excessive amount of soap to form a lather.
HEADER	A chamber for the collection and/or distribution of fluid to or from a multiplicity of parallel flow parts.
HEAT AVAILABLE	The thermal energy above a fixed datum that is capable of being absorbed for useful work. In boiler practice, the heat available in the furnace is usually taken to be the higher heating value of the fuel for combustion corrected by subtracting radiation losses, unburned combustible, latent heat of the water in the fuel or formed by the burning of hydrogen, and adding sensible heat in the air, all above ambient temperatures.
HEAT BALANCE	An accounting of the distribution of the heat input and output.
HEAT EXCHANGER	A vessel in which heat is transferred from one medium to another.
HEATING SURFACE	That surface which is exposed to the heating medium for absorption and transfer of heat to the heat medium.
HEAT RECOVERY BOILER	See Wasteheat boiler.
HEAVY METALS	Metallic elements such as mercury, chromium, cadmium, arsenic, and lead, with high molecular weights. They can damage living things at low concentrations and tend to accumulate in the food chain.
HIGH GAS PRESSURE SWITCH	A switch to stop the burner if the gas pressure is too high.
HIGHER HEATING VALUE	The total heat obtained from the combustion of a specified amount of fuel which is at 60F when combustion starts, and the combustion products of which are cooled to 60 F before the quantity of heat released is measured (see also Calorific Value and Lower Heat Value).
HOPPER	A changer or bid used for holding solid fuel or refuse.
HOPPER BOTTOM FURNACE	A furnace bottom with one or more inclined sides forming a hopper for the collection of ash and for the easy removal of same.

HORIZONTAL FIRING	A means of firing liquid, gaseous or pulverized fuel, in which the burners are so arranged in relation to furnace as to discharge the fuel and air into the furnace in approximately a horizontal direction.
HYDROCARBON	A chemical compound of hydrogen and carbon.
HYDROSTATIC TEST	A strength and tightness test of a closed pressure vessel by water pressure.
IGNITER	A burner smaller than the main burner, which is ignited by a spark or other independent and stable ignition source, and which provides proven ignition energy required to light off the main burner.
IGNITION	The initiation of combustion.
IGNITION ARCH	A refractory arch or surface located over a fuel bed to radiate heat and increase the rapidity of ignition. Usually used with a low volatile fuel such as anthracite coal.
IGNITION PERIOD	See Trial-for Ignition.
IGNITION TEMPERATURE	Lowest temperature of a fuel at which combustion becomes self-sustaining.
IGNITION TORCH	See Lighting-Off Torch.
INCOMPLETE COMBUSTION	The partial oxidation of the combustible constituents of a fuel.
INDUCED DRAFT FAN	A fan exhausting hot gases from the heat absorbing equipment.
INHIBITOR	A substance which selectively retards a chemical action.
INJECTOR	A device utilizing a stem jet to entrain and deliver feedwater into a boiler.
INLET BOXES	An integral part of a fan enclosing the fan inlet or inlets to permit attachment of the fan to the duct system.
INSPECTION DOOR	A small door in the outer enclosure so that certain parts of the interior of the apparatus may be observed.
INSULATION	A material of low thermal conductivity used to reduce heat losses.
INTEGRAL (RESET) CONTROLLER	A controller in which the rate of change of the output is directly proportional to the error. An integral controller will always attempt to drive the error to zero. The units of the constant of proportionality are usually expressed either in repeats per minute or minutes per repeat.
INTERLOCK	A device to prove the physical state of a required condition and to furnish that proof to the primary safety control circuit.
INTERMITTENT BLOWDOWN	The blowing down of boiler water at intervals.
INTERMITTENT IGNITION	An igniter which burns during light-off and while the main burner is firing, and which is shut off with the main burner.
INTERNAL-MIX OIL BURNER	A burner having a mixing chamber in which high velocity steam or air impinges on jets of incoming liquid fuel. The fuel is then discharged in a completely atomized form.
INTERNAL TREATMENT	The tratment of boiler water by introducing chemicals directly into the boiler.
INTERRUPTED IGNITION	An igniter which burns during light-off, and which is shut off (interrupted) during normal operation of the main burner.
INTERTUBE BURNER	A burner which terminates in nozzle discharging between adjacent waterwall tubes.
INERT GASEOUS CONSTITUENTS	Incombustible gases such as nitrogen which may be present in a fuel.
ION	A charged atom or radical which may be positive or negative.
ION EXCHANGE	A reversible process by which ions are interchanged between solids and a liquid with no substantial structure changes of the solid.
JUMPER TUBE	A short tube connection for bypassing routing, or directing the flow of fluid as desired.
LAGGING	A covering, usually metallic to protect insulating material, on boilers, pipes, or ducts.
LANCE DOOR	A door through which a hand lance may be inserted for cleaning heating surfaces.
LATCH SWITCH	A control to prevent fuel valve opening if the burner is not secured in the firing position.

LEAKAGE	The uncontrolled quantity of fluid which enters or leaves through the enclosure of air or gas passage.
LIGAMENT	The minimum cross section of solid metal in a header, shell, or tube sheet between two adjacent holes.
LIGHTING-OFF TORCH	A torch used for igniting fuel from a burner. The torch may consist of asbestos wrapped around an iron rod and saturated with oil or may be a small oil or gas burner.
LIGNITE A	A coal of low ASTM classification by rank with calorific value limits on a moist, mineral-matter-free basis between 6,300 and 8,300 Btu per pound.
LIGNITE B	A coal of lowest ASTM classification by rank with calorific value limits on a moist, mineral-matter-free basis less than 6,300 Btu per pound.
LINING	The material used on the furnace side of a furnace wall. It is usually high grade refractory tile or brick or plastic refractory material.
LINK	An element of the chain of a chain grate stoker.
LIVE STEAM	Steam which has not performed any of the work for which it was generated.
LOAD	The acteual instantaneous outpout rate of a boiler.
LONG FLAME BURNER	A burner in which the fuel emerges in such a condition, or one in which the air for combustion is admitted in such a manner, that the two do not readily mix, resulting in a comparatively long flame.
LOW DRAFT SWITCH	A control to prevent burner operation if the draft is too low. Used primarily with mechanical draft.
LOWER HEAT VALUE	The higher heating value minus the latent heat of vaporization of the water formed by the oxidation of hydrogen bearing compounds in the fuel and the vaporization of water in the fuel.
LOW-FIRE START	The firing of a burner with controls in a low-fire position to provide safe operating condition during light-off.
LOW GAS PRESSURE SWITCH	A control to stop the burner if gas pressure is too low.
LOW OIL TEMPERATURE SWITCH	(Cold Oil Switch) A control to prevent burner operation if the temperature of the oil is too low.
LOW WATER CUTOFF	A device to stop the burner on unsafe water conditions in the boiler.
LUG	Any projection used for supporting or grasping.
LUMINOSITY	Emissive power with respect to visible radiation.
MAKE-UP	The water added to boiler feed to compensate for that lost through exhaust, blowdown, leakage, etc.
MANHEAD	The head of a boiler drum or other pressure vessel having a manhole.
MANHOLE	The opening in a pressure vessel of sufficient size to permit a man to enter.
MANIFOLD	A pipe or header for collecting a fluid from, or the distributing of a fluid to a number of pipes or tubes.
MEASURING DEVICE	Any device used to indicate the magnitude of a property (such as flow rate).
MECHANICAL ATOMIZING OIL BURNER	A burner which uses the pressure of the oil for atomizing.
MECHANICAL DRAFT	The negative pressure created by mechanical means.
MECHANICAL EFFICIENCY	The ratio of power outpout to power input.
MECHANICAL STOKER	A device consisting of a mechanically operated fuel feeding mechanism and a grate, used for the purpose of feeding solid fuel into a furnace, distribute it over a grate, admitting air to the fuel for the purpose of combustion, and providing a means for removal or discharge of refuse. 1. OVERFEED STOKER — A stoker in which fuel is fed onto grates above the point of air admission to the fuel bed. Overfeed stokers include: a. FRONT FEED, INCLINED GRATE — A stoker in which fuel is fed from the front onto a grate inclined downwards toward the rear of the stoker. b. SIDE FEED, DOUBLE INCLINED GRATE — A stoker in which fuel is fed from both sides onto grates inclined downwards towards the centerline

MECHANICAL STOKER (Cont'd)

of the stoker.

c. CHAIN OR TRAVELING GRATE — A stoker having a moving endless grate which conveys fuel into and through the furnace where it is burned, after which it discharges the refuse.

d. VIBRAGRATE — An inclined vibrating stoker in which fuel is conveyed into and through the furnace where it is burned, after which it discharges the refuse.

2. SPREADER STOKER — A stoker that distributes fuel into the furnace from a location above the fuel bed with a portion of the fuel burned in suspension and a portion on the grates. Spreader stokers include:

a. STATIONARY GRATE — A stoker in which fuel is fed onto a fixed position grate.

b. DUMP GRATE — A stoker in which fuel is fed onto a nonmoving grate which is arranged to allow intermittent discharge of refuse through tilting action of the grate bars.

c. CONTINUOUS ASH DISCHARGE OR TRAVELING GRATE — A stoker in which fuel is fed onto a moving endless grate which conveys the fuel into and through the furnace where it is burned, after which it discharges the refuse.

3. UNDERFEED STOKER — A stoker in which fuel is introduced through retorts at a level below the location of air admission to the fuel bed. Underfeed stokers are divided into three general classes, as follows:

a. A side ash discharge underfeed stoker is a stoker having one or more retorts which feed and distribute fuel onto side tuyeres or a grate through which air is admitted for combustion and over which the ash is discharge at the side parallel to the retorts.

b. A rear discharge underfeed stoker is a stoker having a grate composed of transversely spaced underfeed retorts, which feed and distribute solid fuel to intermediate rows of tuyeres through which is admitted air for combustion.

The ash is discharged from the stoker across the rear end.

c. A continuous ash discharge underfeed stoker is one in which the refuse is discharged continuously from the normally stationary stoker ash tray to the ash pit, without the use of mechanical means othter than the normal action of the coal feeding and agitating mechanism.

META-ANTHRACITE — Highest coal classification according to rank. Dry fixed carbon 98% or more and dry volatile matter 2% or less, on a mineral-matter-free basis.

MICROPROCESSOR CONTROL — Utilizes a small microcomputer chip to perform requirements of a system control package. The microprocessor containers support chips to store all necessary control system instructions in what is called memory. Usually, all changes in system logic can be performed without any rewiring or component changes.

MINERAL-MATTER-FREE BASIS — The method of reporting coal analysis whereby the ash plus other minerals which are in the original coal are eliminated and the other constituents recalculated to total 100%.

MOISTURE — Water in the liquid or vapor phase.

MOISTURE AND ASH FREE BASIS — Method of reporting coal analysis. See Dry, Ash Free Basis.

MOISTURE IN STEAM — Particles of water carried in steam. Usually expressed as the percentage by weight.

MOISTURE LOSS — The loss representing the difference in the heat content of the moisture in the exit gases and that at the temperature of the ambient air.

MONITORING — Periodic or continuous sampling to determine the level of pollution.

MONOLITHIC BAFFLE — A baffle of poured or rammed refractory material.

MUD OR LOWER DRUM	A pressure chamber of a drum or header type located at the lower extremity of a watertube boiler convection bank which is normally provided with a blow-off valve for periodic blowing off of sediment collecting in the bottom of the drum.
MULTIFUEL BURNER	A burner by means of which more than one fuel can be burned either separately or simultaneously, such as pulverized fuel, oil, or gas.
MULTI-PASS ARRANGEMENT	Heat absorbing surfaces so baffled as to provide two or more passes in series.
MULTIPLE RETORT STOKER	An underfeed stoker consisting of two or more retorts, parallel and adjacent to each other, but separated by a line of tuyeres, asnd arranged so that the refuse is discharged at the ends of the retorts.
MULTIPORT BURNER	A burner having a number of nozzles from which fuel and air are discharged.
NATURAL CIRCULATION	The circulation of water in a boiler caused by differences in density; also referred to as thermal or thermally induced circulation.
NATURAL DRAFT STOKER	A stoker in which the flow of air through the grate is caused by the difference of pressure between the furnace and the atmosphere.
NATURAL GAS	Gaseous fuel occurring in nature.
NET FAN REQUIREMENTS	The calculated operating conditions for a fan excluding tolerances.
NEUTRAL ATMOSPHERE	An atmosphere which tends neither to oxidize nor reduce immersed materials.
NOx	A notation meaning oxides of nitrogen.
NOx PORT AIR	Air that is added downstream of the primary combustion zone to achieve off-stoichiometric combustion and reduce NOx emissions.
NOZZLE	A short flanged or welded neck connection on a drum or shell for the outlet or inlet of fluids; also a projecting spout for the outlet or inlet of fluids; also a projecting spout through which a fluid flows.
NUT	Anthracite coal designation through 1⅝" over 15/16" round mesh screen. Bituminous coal size designation by some chosen screen mesh size. as 2" x ¾".
NUT AND SLACK	A combination of Nut and Slack coal, such as 2" x ¾" Nut plus ¾" x Slack (see Slack).
OIL BURNER	A burner for firing oil.
OIL CONE	The cone of finely atomized oil discharged from an oil atomizer.
OIL HEATER	A Heat exchanger utilizing steam, hot water, or electricity to heat oil to the desired viscosity.
OIL HEATING AND PUMPING SET	See Pump and Heater Set.
OPACITY	The degree to which emissions reduce the transmission of light and obscure the view of an object in the background. Usually defined as a number between 0 and 100%. At 0%, light is completely unobstructed and at 100%, light is completely obstructed. (Opacity numbers with respect to boiler emissions are not intended to include the effect of condensing water vapor). See Smoke Number, Ringlemann and Smoke Spot Number (Bacharach).
OPEN FURNACE	A furnace, particularly as applied to chain or traveling grate stoker containing essentially no arches.
ORGANIC MATTER	Compounds containing carbon often derived from living organisms.
ORIFICE	1. The opening from the whirling chamber of a mechanical atomizer or the mixing chamber of a steam atomizer through which the liquid fuel is discharged. 2. A delvice inserted into a pipeline to create a pressure drop to be used for the purpose of measuring fluid flow.
ORSAT	A gas-analysis apparatus in which certain gaseous constituents are measured by absorption in separate chemical solutions.
OVERFIRE AIR	Air for combustion admitted into the furnace at a point above the fuel bed.
OVERFIRE AIR FAN	A fan used to provide air to a combustion chamber above the fuel bed.
OXIDANT	A substance containing oxygen that reacts chemically in air to produce a new substance.
OXIDATION	Chemical combination with oxygen.
OXIDIZING ATMOSPHERE	An atmosphere which tends to promote the oxidation of immersed materials.

OXYGEN ATTACK	Corrosion or pitting in a boiler caused by oxygen.
PACKAGED STEAM GENERATOR	A boiler equipped and shipped complete with fuel burning equipment, mechanical draft equipment, automatic controls and accessories.
PACKED TOWER	A pollution control device that forces dirty air through a tower packed with loose pellete-like material of various shapes or a fixed grid type material, while liquid is sprayed over the packing material. The pollutants in the air stream either dissolve or chemically react with the liquid.
PAD	See Boss. A pad is larger than a boss and is attached to a pressure vessel.
PARALLEL FLOW BURNER	A type or class of burners which includes the venturi burner. The burner is characterized by the lack of register spin louvres and normally has a venturi section to straighten, balance, and in some cases, meter air flow. The flame is stabilized by either a diffuser, spinner, or bluff body.
PARALLEL POSITIONING	Fuel and sir control elements have separate actuators responding to the same load signal simultaneously. At least one of the actuators has a positioner to set air-fuel ratio with load.
PARTICULATES	Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog found in the air or emissions.
PASS	A confined passageway through which a fluid, gas, or products of combination flows in essentially one direction.
PEA	Anthracite or bituminous coal size. In anthracite through 13/16" over 9l6" round hole screen; in bituminous ¾" x ⅜".
PEAK LOAD	The maximum load carried for a stated period of time.
PEEP HOLE	A small hole in a door covered by a movable cover.
PETEROLEUM	Naturally occurring mineral oil consisting predominately of hydrocarbons.
pH	A measure of the acidity of alkalinity of a material, liquid, or solid. pH is represente on a scale of 0 to 14 with 7 being a neutral state, 0 most acid and 14 most alkaline.
PILOT	See Igniter.
PILOT FLAME ESTABLISHING.	The length of time fuel is permitted to be delivered to a proved pilot before the flame-sensing device is required to detect pilot flame.
PILOT, PROVED	A pilot flame which has been detected by flame failure controls.
PILOT STABILIZATION PERIOD	A time interval synonymous on most systems today with timed trial for pilot ignition. Modern programmers prevent main valve operation for a specified number of seconds after commencement of trial for pilot ignition even though pilot is immediately proved.
PITTING	A concentration attack by oxygen or other corrosive chemicals on a boiler, producing a localized depression in the metal surface.
PLENUM	An enclosure through which gas or air passes at relatively low velocities.
PNEUMATIC CONTROL	Utilizes gas pressure (usually air) as the primary motive force for control elements, and as the signal between control devices. The maximum and minimum pressures are usually 3 and 15 psig, but can be other values as well.
PNEUMATIC CONVEYING	The transportation of fuel through a conduit by air.
POPPING PRESSURE	The pressure at which a safety valve opens.
PORT	An opening through which fluid passes.
POSITION INDICATOR	A device which provides means for determining a control elements position.
POUR POINT	An indication of the lowest temperature at which liquid fuels can be stored and still be capable of flowing under gravitational forces.
POWER INPUT	The energy required to drive auxiliary equipment, expressed in brake horsepower delivered to shaft or kilowatts to drive motor.
PARTS PER MILLION	A method of expressing tiny concentrations. In air or flue gas, usually a volume/volume ratio; may also be used as a weight/weight or a weight/volume ration.
PARTS PER MILLION (Cont'd)	Abbreviated ppm.
PRECIPITATE	To separate materials from a solution by the formation of insoluble matter by chemical

	reaction. The material which is removed.
PRECIPITATOR	An ash separator and collector of the electrostatic type.
PREHEATED AIR	Air at a temperature exceeding that of the ambient air.
PRESSURE DROP	The difference in pressure between two points in a system.
PRODUCTS OF COMBUSTION	The gases, vapors, and solids resulting from the combustion of fuel.
PROGRAMMABLE CONTROLLER	Similar to microprocessor control, but utilizing a simplified method of entering instructions into memory. Abbreviated PC.
PROGRAM TIMER	A timing device which actuates a series of switches in programmed sequence.
PROJECTED GRATE AREA	The horizontal projected area of the stoker grate.
PROPORTIONAL CONTROL	A mode of control in which there is a continuous linear relation between value of the controller variable and position of the final control element (modulating control).
PROPORTIONAL CONTROLLER	A controller in which the position of the output is directly proportional to the error. The constant of proportionality is called gain and usually expressed in percent. In practice, proportional controllers are usually combined with integral action to eliminate residual error. (See Integral (reset) Controller).
PUFF	A minor combustion explosion within the boiler furnace or setting.
PULSATION	Rapid fluctuations in furnace pressure.
PULVERIZER	A machine which reduces a solid fuel to a fineness suitable for burning in suspension.
PUMPS AND HEATER SETE	Assembled unit consisting of oil heater, fuel pump, strainer, valve, and piping and temperature controls. May be either simplex or duplex arrangements.
PUMP, AUTOMATIC OIL	A pump which automatically pumps oil from the supply tank and delivers the oil under a constant head to an oil-burning appliance.
PUMP, OIL-TRANSFER	An oil pump, automatically or manually operated, which transfers through continuous piping from a supply tank to an oil burning appliance or to an auxiliary tank.
PURGE	To introduce air into the furnace and the boiler flue passage in such volume and manner as to completely replace the air or gas-air mixture contined therein.
PURGE METER INTERLOCK	A flow meter so arranged that an air flow through the furnace above a minimum amount must exist for a definite time interval before the interlocking system will permit an automatic igniter to be placed in operation.
PURGE, POST	A method of scavenging the furnace and boiler passes to remove all combustible gases after flame failure controls have sensed pilot and main burner shutdown and safety shut-off valves are closed.
PURGE, PRE—IGNITION	A method of scavenging the furnace and boiler passes to remove all combustible gases before the ignition system can be energized.
PURITY	The degree to which a substancel is free of foreign materials.
PUSHER	A device for giving motion to fuel bed by reciprocating motion, such as moving block in the bottom of a retort.
PYRITES	A compound of iron and sulfur naturally occurring in coal.
RADIATION LOSS	A comprehensive term used in a boiler-unit heat balance to account for the conduction, radiation, and convection heat losses from the settings to the ambient air.
RAM	A form of plunger used in connection with underfeed stokers to introduce fuel into retorts. See also Pusher.
RANK	Method of coal classification based on the degree of progressive alteration in the natural series from Lignite B to meta-anthracite. The limits under classifications according to rank are on a mineral-matter-free basis.
RATE OF BLOWDOWN	A rate normally expressed as a percentage of the incoming water.
RAW WATER	Water supplied to the plant before treatment.
REAR DISCHARGE STOKER	A stoker so arranged that refuse is discharged from the grate surface at the end opposite the coal fuel.

RECIPROCATING GRATE	A grate element which has reciprocating motion, usually for the purpose of fuel agitation.
RECIRCULATING LINE	Piping and connections on a heat exchanger through which fluid is returned from the outlet to the inlet.
REDUCING ATMOSPHERE	An atmosphere which tends to promote the removal of oxygen from immersed materials.
REDUCTION	Removal of oxygen from a chemical compound.
REFRACTORY	Material that will withstand temperatures above 500F without distortion or deterioration.
REGISTER BURNER	A type or class of burner. Air is admitted through one or multiple zones of adjustable louvres which impart a rotary motion to the air. The flame is stabilized by the swirling air from the register louvres and internal eddies generated downstream of the diffuser and external eddies generated downstream of the throat exit.
REGISTER RETORT	A trough or channel in an underfeed stoker, extending within the furnace, through which fuel is forced upward into the fuel bed.
REGULATOR, GAS PRESSURE	A spring loaded, dead weighted or pressure balanced device which will maintain a nearly constant gas pressure to the burner supply line.
RELATIVE HUMIDITY	The ratio of the weight of water vapor present in a unit volume of gas to the maximum possible weight of water vapor in unit volume of the same gas at the same temperature and pressure.
RELAY CONTROL	Utilizes electro-mechanical relays to perform logic function (on/off status) as burner sequencing and/or safety control. A relay control system usually incorporates timers and/or motor-driven program timers in addition to relays.
RESIDUAL OILS	Oils which are too heavy to be evaporated in any normal evaporation or distillation process and are thus left over from that process. Such oils are frequently cracked (high temperature fractionation) or catalytically cracked (fractionation in presence of alumina-silica catalyst).
RETARDER	A straight or helical strip inserted in a firetube primarily to increase the turbulence and improve heat transfer. Also called Turbulator.
RETRACTABLE BLOWER	A soot blower in which the blowing element can be mechanically extended into and retracted out of the boiler.
RETURN FLOW OIL BURNER	A mechanical atomizing oil burner in which part of oil supplied to the atomizer is withdrawn and returned to storage or to the oil line supplying the atomizer.
RICE	Anthracite coal size, otherwise known as No. 2 Buckwheat — through 5/16" over 3/16" round mesh screen.
RINGLEMANN CHART	AA series of four rectangular grids of black lines of varying widths printed on a white background, used as a criterion of blackness for determining smoke density.
RINGLEMANN NUMBER	See Smoke Number, Ringlemann.
RISER TUBE	A tube through which steam and water passes from an upper waterwall header to a drum.
ROLLED JOINT	A joint made by expanding a tube into a hole by a roller expander.
ROTARY OIL BURNER	A burner in which atomization is accomplished by feeding oil to the inside of a rapidly rotating cup.
RUN OF MINE	Unscreened bituminous coal as it comes from the mine.
SADDLE	A casting, fabricated chair, or member used for the purpose of support.
SAFETY SHUTDOWN	The action of shutting off all fuel and ignition energy to the burner by means of safety control or controls such that restart cannot be accomplished without operator action.
SAFETY VALVE	A spring loaded valve that automatically opens when pressure attains the valve setting. Used to prevent excessive pressure from building up in a boiler.
SAMPLING	The removal of a portion of a material for examination or analysis.
SATURATED AIR	Air which contains the maximum amount of water vapor that it can hold at its temperature and pressure.
SATURATED STEAM	Steam at the pressure corresponding to its saturation temperature.

SATURATED WATER	Water at it's boiling point.
SATURATION TEMPERATURE	The temperature at which evaporation occurs at a particular pressure.
SCALE	A hard coating or layer of chemical materials on internal surfaces of boiler pressure parts.
SCREEN	A perforated plate, cylinder or mesh fabric, usually mounted on a frame for separating coarser from finer parts.
SCREENING	The undersized coal from a screen process (often minus ¾" or smaller, bituminous).
SCREW FEED	A means of introducing fuel by rotation of a screw.
SEAL	A Device to close openings between structures to prevent leakage.
SEALING AIR	Air at a pressure slightly exceeding boiler internal gas pressures used to prevent flow of combustion gases from escaping the boiler, usually taken from a force draft fan.
SEAL WELD	A weld used primarily to obtain tightness and prevent leakage.
SEAM	The joint between two plates welded or riveted together.
SEAM	A continuous tubular deposit of vegetal or sedimentary origin bedded between parallel strata of sandstone, shale, or clay.
SECONDARY COMBUSTION	Combustion which occurs as a result of ignition at a point beyond the furnace (see also Delayed Combustion).
SEDIMENT	Matter in water which is in suspension and can be removed by gravity or mechanical means. Non-combustible solid matter which settles out at the bottom of an oil tank; a small percentage is present in residual fuel oils.
SEMI-ANTHRACITE	A coal classification according to rank. Dry fixed carbon 85% or more and less than 92% and dry volatile matter 14% or less and more than 8%, on a mineral-matter-free basis.
SEMI-BITUMINOUS	A former coal classification according to rank — including Low Volatile Bituminous.
SEMI-FUSED SLAG	Hard slag masses consisting of particles which have partly fused together.
SEPARATOR	A device for separating solid matter from a conveying fluid; an electeromagnetic device for the removal of magnetic ores or tramp iron from coal.
SERVICE WATER	General purpose water which may or may not have been treated for a special purpose.
SET POINT	A control reference point which represents a desired value of a measured property.
SHAKING GRATE	A grate from which refuse is removed by motion of the grate causing the refuse to sift through openings in or between the grate.
SHELL	The joint between two plates welded or riveted together.
SIDE AIR ADMISSION	Admission of air to the underside of a grate from the sides of a chain or traveling grate stoker.
SIDE DUMP STOKER	A stoker so arranged that refuse is discharged from a dump plate at the side of the stoker.
SIEVE	A laboratory apparatus with meshes through which the finer particles of a substance are passed to separate them from the coarser particles.
SIFTINGS	Fine particles of solid fuel which sift through a grate.
SIGNAL	A continuous level of information, transmitted to or from control devices, from which there exists a maximum and minimum value defined by the transmission method and control interpretation. For example, an electronic signal may be based on 4 to 20 milliamps (MA) of which 4 MA = the minimum or 0 percent and 20 MA= the maximum or 100 percent.
SILT	Finely divided anthracite obtained as a residue from cleaning process.
SINGLE POINT POSITIONING	Fuel and air control elements are mechanically linked to a common actuator which modulates the two control elements as a unit in response to load. Fuel air ratio is varied with firing rate by means of a mechanical cam arrangement.
SINGLE RETORT STOKER	An underfeed stoker using one retort only in the assembly of a complete stoker.
SKIN CASING	Casing located in direct contact with boiler tubes used to maintain an air tight envelope.
SLACK	Screening, or fine coal; maximum top size seldom above 2½".

SLACKING	Breaking down of friable coals due to changes in moisture contents.
SLAG	Molten or fused solid matter.
SLEEVE	A tubular member through a wall to permit passage of pipe or other connections.
SLIP SEAL	A seal between members designed to permit movement of either member by slipping or sliding.
SLUG	A large "dose" of internal chemical treatment applied intermittently to a steam boiler. Also sometimes used instead of "priming" to denote a discharge of water from a boiler steam outlet in relatively large intermittent amounts.
SMOG	Air pollution associated with oxidants.
SMOKE	Small gas borne particles of carbon or soot, less than 1 micron (0.001 mm) in size, resulting from incomplete combustion of carbonaceous materials and in sufficient number to be observable.
SMOKE NUMBER, RINGLEMANN	An integer between 0 and 5 that is used to describe the "darkness density" or degree of blackness of a visible stack plume. The technique involves comparing standard Ringlemann charts to the stack plume visually. A smoke number of 0 indicates complete non-black and a 5 indicates complete black.
SMOKE SPOT NUMBER (BACHARACH)	An integer between 0 and 9 that is used to indicate the relative smoke density of stack flue gas. The technique is to draw a specified amount of stack gas through filter paper and compare the "smoke spot" to standard shaded smoke spots.
SOFTENING	The act of removing scale-forming calcium and magnesium impurities from water.
SOFT WATER	Water which contains little or no calcium or magnesium salts, or water from which scale-forming impurities have been removed or reduced.
SOLID STATE CONTROL	Utilizes solid state semiconductor components in a hardwired system to perform logic and sequencing control and/or process control. Any changes in system logic usually require rewiring, relocation/replacement of components, addition c components, or any combination thereof.
SOOT	Carbon dust formed by incomplete combustion.
SOOT BLOWER	A mechanical device for discharging steam or air to clean heat absorbing surfaces.
SOx	A notation meaning oxides of sulfur.
SPALLING	The breaking off of the surface refractory material as a result of internal stresses resulting from an excessive temperature gradient.
SPECIFIC HEAT	The quantity of heat, expressed in Btu, required to raise the temperature of 1 lb. of a substance 1 degree fahrenheit.
SPLASH PLATE	An abrasion-resistant metal plate, forming the back of an elbow in a pulverized-fuel-and-air line, against which the fluidized material strikes and is dispersed for the purpose of obtaining uniform distribution in the succeeding line or burner.
SPLITTER	Plates spaced in an elbow of a duct so disposed as to guide the flow of fluid through the elbow with uniform distribution and to minimize pressure drop.
SPONGE ASH	Accumulation of dry ash particles into soft structures having a spongy appearance.
SPONTANEOUS COMBUSTION	Ignition of combustible material following slow oxidation without the application of high temperature from an external source.
SPRAY ANGLE	The angle included between the sides of the cone formed by liquid fuel discharged from mechanical, rotary atomizers, and by some forms of steam or air atomizers.
SPRAYER PLATE	A Metal plate used to atomize the fuel in an atomizer of an oil burner.
SPRAY NOZZLE	A Nozzle from which a liquid fuel is discharged in the form of a spray.
SPRAY TOWER	A duct through which liquid particles flow counter-current to a column of gas; a fine spray is used when the object is to concentrate the liquid, a coarse spray when the object is to remove solids and objectionable materials from gases.
SPUD BURNER	A type of gas burner consisting of several pipes with orifices.
SPUN ENDS	The ends of hollow members closed by rolling members rigidly in position.

STACK	A vertical conduit to discharge combustion products to the atmosphere. Also called Chimney.
STACK EFFECT	Hot gases, as in a chimney, that move upward because they are warmer than the surrounding atmosphere.
STANDARD CUBIC FOOT	A standard cubic foot is referred to 60° F and 14.696 pounds per square inch pressure. A dry cubic foot of air at these conditions weighs .0763 lbs and has a specific gravity of 1.00. Usually abbreviated SCF.
STANDARD TEMPERATURE AND PRESSURE	Conditions at which a standard volume of gases is defined. Sometimes abbreviated as STP. 1. Boilers (U.S.) — Standard temperature is 60° F, standard pressure is 14.7 psia. 2. Air Pollution Control (U.S.) — Standard temperature is 70° F, standard pressure is 14.7 psia. 3. Other — Standard temperature is 32° F, standard pressure is 14.7 psia.
STANDARD VOLUME	The volume of a gas at standard temperature and pressure. In the U.S., this is normally expressed as standard cubic feet.
STATIONARY GRATE	A grate having no moving parts.
STAY	A tensile stress member to hold material or other members rigidly in position.
STAYBOLT	A bolt threaded through or welded at each end, into two spaced sheets of a firebox or box header to support flat surfaces against internal pressure.
STEAM	The vapor phase of water substantially unmixed with other gases.
STEAM AND WATER DRUM	A pressure chamber located at the upper extremity of a boiler circulatory system in which the steam generated in the boiler is separated from the water and from which steam is discharged at a position above a water level maintained therein.
STEAM ATOMIZING OIL BURNER	A burner for firing oil which is atomized by steam. It may be of the internal or external mixing type.
STEAM-COOLED WALL	A wall partly or completely covered with superheater or reheater tubes.
STEAM DOME	A receptacle riveted or welded to the top sheet of a firetube boiler through and from which the steam is taken from the boiler.
STEAM DRYER	A series of screens, wires, or plates through which steam is passed to remove entrained moisture.
STEM GAGE	A gage for indicating the pressure of steam.
STEAM QUALITY	The percent by weight of vapor in a steam and water mixture.
STEAM SEPARATOR	A device for removing the entrained water from steam.
STOICHIOMETRIC COMBUSTION	The complete oxidation of all the combustible constituents of a fuel, utilizing the exact, theoretically required amount of oxygen.
STOKER	See Mechanical Stoker.
STOKER GATE	An element of a stoker, placed at the point of entrance of fuel into the furnace and by means of which the depth of fuel on the stoker grate may be controlled. It is generally used in connection with chain or traveling grate stokers and has the form of guillotine.
STOKER GRATE	That part of the stoker within the space defined by the walls of the furnace at the fuel bed level which forms the bottom of the furnace and supports the fuel bed. On a chain or traveling grate stoker, the fuel bed is considered to be supported only to the center line of the rear shaft or its equivalent.
STRAINER, OIL	A device, such as as filter, to retain solid particles allowing a liquid to pass.
STRENGTH WELD	A weld capable of withstanding a design stress.
STRINGER SUPPORT TUBE	Vertical tubes containing water or steam which act as supports for horizontally oriented convection surface.
STUB TUBE	A short tube welded to a pressure part for field extension.
STUD	A projecting pin serving as a support or means of attachment.
STUD TUBE	A tube having short studs welded to it.
STUD TUBE WALL	A tube wall covered with refractory which is held in place by stud anchors attached to the tubes.

SUB-BITUMINOUS COAL	Coal classification according to rank: 1. Moist Btu 10,500 or more and less than 11,500 2. Moist Btu 9,500 or more and less than 10,500 3. Moist Btu 8,300 or more and less than 9,500
SUPERHEAT	To raise the temperature of steam above its saturation temperature. The temperature in excess of its saturation temperature.
SUPERHEATED STEAM	Steam at a higher temperature than its saturation temperature.
SUPERHEATER	A group of tubes which absorb heat from the products of combustion to raise the temperature of the vapor passing through the tubes above its saturation temperature.
SUPPLY TUBE	A tube which carries water to the inlet water header.
SURFACE BLOWOFF	Removal of water, foam, etc., from the surface at the water level in a boiler. The equipment for such removal.
SURFACE MOISTURE	That portion of the moisture in the coal which comes from external sources as water seepage, rain, snow, condensation, etc.
SURGE	The sudden displacement or movement of water in a closed vessel or drum.
SUSPENDED SOLIDS	Undissolved solid in boiler water.
SWEAT	The condensation of moisture from a warm saturated atmosphere on a cooler surface. A slight weep in a boiler joint, not in sufficient amount to form drops.
SWELL	The sudden increase in the volume of the steam in the water-steam mixture below the water level.
SWINGING LOAD	A load that changes at relatively short intervals.
TEMPERING MOISTURE	Water added to certain coals which, as received, have insufficient moisture content for proper combustion on stokers.
TERTIARY AIR	Air for combustion supplied to the furnace to supplement the primary and secondary air.
THEORETICAL AIR	The quantity of air required for perfect combustion. Also called Stoichiometric Air.
THERM	A unit of heat applied especially to gas. One therm = 100,000 Btu.
THERMAL SLEEVE	A spaced internal sleeve lining of a connection for introducing a fluid of one temperature into a vessel containing fluid at a substantially different temperature, used to avoid abnormal stresses.
THROAT	Burner exit, geometrically designed to provide the proper air-fuel expansion for flame shaping and flame stabilization, sometimes referred to as the quarl.
THROUGH STAY	A brace used in firetube boilers between the heads or tube sheets.
TIE BAR	A structural member designed to maintain the spacing of furnace waterwall tubes.
TIE PLATE	A plate, through which a bolt or tie rod is passed, to hold brick in place.
TIE ROD	A tension member between buckstays or tie plates.
TILE	A preformed burner refractory, usually applied to shapes other than standard brick.
TILE BAFFLE	A baffle formed of preformed burner refractory shapes.
TOTAL AIR	The total quantity of air suplied to the fuel and products of combustion. Percent total air is the ratio of total air to theoretical air expressed as percent.
TOTAL MOISTURE	The sum of inherent moisture and surface moisture in coal.
TOTAL SOLIDS CONCENTRATION	The weight of dissolved and suspended impurities in a unit weight of boiler water, usually expressed in ppm.
TRANSDUCER	A device to convert information from one form to another. The usual application is converting physical states such as pressure, temperature, etc., into a pneumatic or electronic signal.
TRAVELING GRATE STOKER	A stoker similar to a chain grate stoker with the exception that the grate is separate from but supported on and driven by chains. Only enough chain strands are used as may be required to support and drive the grate.
TREATED WATER	Water which has been chemically treated to make it suitable for boiler feed.

TRIAL-FOR-IGNITION	That period of time during which the programming flame failure controls permit the burner fuel valves to be open before the flame sensing device is required to detect the flame.
TUBE	A hollow cylinder for conveying fluids.
TUBE CLEANER	A device for cleaning tubes by brushing, hammering, or by rotating cutters.
TUBE DOOR	A door in a boiler or furnace wall through which tubes may be removed or new tubes passed.
TUBE HOLE	A hole in a drum, header, or tube sheet to accommodate a tube.
TUBE SEAT	That part of a tube hole with which a tube makes contact.
TUBE SHEET	The plate containing the tube holes.
TUBE-TO-TUBE WALL	A waterwall in which the tubes are substantially tangent to each other with essentially no space between the tubes.
TUBE TURBINING	The act of cleaning a tube by means of a power-driven rotary device which passes through the tube.
TURBIDITY	The optical obstruction to the passing of a ray of light through a body of water, caused by finely divided suspended matter.
TURBULATOR	See Retarder.
TURBULENT BURNER	A burner in which fuel and air are mixed and discharged into the furnace in such a manner as to produce turbulent flow from the burner.
TUYERES	Forms of grates, located adjacent to a retort, through which air is introduced.
ULTIMATE ANALYSIS	See Analysis, Ultimate.
UNACCOUNTED-FOR LOSS	That portion of a boiler heat balance which represents the difference between 100 percent and the sum of the heat absorbed by the unit and all the classified losses expressed as percent.
UNBURNED COMBUSTIBLE	The combustible portion of the fuel which is not completely oxidized.
UNBURNED COMBUSTIBLE LOSS	See Combustible Loss.
UNFIRED PRESSURE VESSEL	A vessel designed to withstand internal pressure, neither subjected to heat from products of combustion nor an integral part of a fired pressure vessel system.
USE FACTOR	The ratio of hours in operation to the total hours in that period.
VALVE, FUEL CONTROL	An automatically or manually operated device consisting essentially of a regulating valve and an operating mechanism. It is used to regulate fuel flow.
VANE	A fixed or adjustable plate inserted in a gas or air stream used to change the direction of flow (see also Splitter).
VANE CONTROL	A set of movable vanes in the inlet of a fan to provide regulation of air or gas flow.
VAPORIZATION	The change from liquid or solid phase to the vapor phase.
VAPOR PLUMES	Flue gases that are visible because they contain water droplets.
VENT	An opening in a vessel or other enclosed space for the removal of gas or vapor.
VERTICAL FIRING	An arrangement of a burner such that air and fuel are discharged into the furnace, in practically a vertical direction, either up or down.
VISCOSITY	The measure of the internal friction of a fluid or of its resistance to flow. In fuel oil, it is highly significant since it indicates both the relative ease with which the oil will flow or may be pumped, and the ease of atomization.
VITREOUS SLAG	Glassy slag.
VOLATILE MATTER	Those products given off by a material as gas or vapor, determined by definite prescribed methods.
VOLATILIZATION	See Vaporization.
WALL BLOWER	A short retractable blower for cleaning adjacent waterwall heat absorbing surfaces.
WALL BOX	A structure in a wall of a steam generator through which apparatus, such as soot blowers, extend into the setting.
WASTE HEAT	Sensible heat in non-combustible gases, such as gases leaving furnaces used for processing metals, ores, or other materials.

WASTE HEAT BOILER	A boiler that recovers normally unused energy and converts it to usable heat.
WATER AND SEDIMENT	Moisture and foreign matter in liquid fuel. Appreciable amounts of water and sediment tend to cause fouling of handling equipment.)
WATER BACK	One or more horizontal watertubes located over and laterally across the ash discharge end of a stoker to prevent ash adhesion to the wall and to reduce air leakage form the ash pit into the furnace.
WATER COLUMN	A vertical tubular member connected at its top and bottom to the steam and water space respectively of a boiler, to which the water gage, gage cocks, and high and low level alarms may be connected.
WATER COOLED BAFFLE	A baffle composed essentially of closely spaced boiler tubes.
WATER COOLED BURNER THROAT	Burner throat water cooled by waterwall tubes bent to conform to the throat and covered by refractory.
WATER-COOLED STOKER	A stoker having tubes in or near the grate surface through which water is passed for cooling the grates.
WATER-COOLED WALL	A furnace wall containing watertubes.
WATER GAGE	The gage glass and its fittings for attachment.
WATER HAMMER	A sudden increase in pressure of water due to an instantaneous conversion of momentum to pressure.
WATER LEG	A vertical or nearly vertical box header, sectional header, or water-cooled sides of an internal firebox composed of flat or circular surfaces.
WATER LEVEL	The elevation of the surface of the water in a boiler.
WATER SEAL	A seal against leakage of air into a furnace consisting of a metal sheet, the lower edge of which is submerged in a trough containing water.
WATER TUBE	A tube in a boiler having the water and steam on the inside and heatl applied to the outside.
WATER VAPOR	A synonym for steam, usually used to denote steam of low absolute pressure.
WEATHERING	Same as Slacking.
WEEP	A term usually applied to a minute leak in a boiler joint which forms droplets (or tears) of water very slowly.
WELDED WALL	A furnace closure wall made up of closely spaced waterwall tubes welded to each other or to an intermediate fin to form a continuous air tight structure.
WET-BULB TEMPERATURE	The lowest temperature which a water wetted body will attain when exposed to an air current. The temperature of adiabatic saturation.
WETNESS	A term used to designate the percentage of water in steam. Also used to describe the presence of a water film on heating surface interiors.
WET STEAM	Steam containing moisture.
WETTING	The process of supplying a water film to the water side of a heating surface.
WIDE RANGE MECHANICAL ATOMIZING OIL BURNER	A burner having an oil atomizer with a range of flow rates greater than that obtainable with the usual mechanical atomizers (see also Return Flow Oil Burner).
WINDBOX	A chamber below the grate or surrounding a burner, through which air under pressure is supplied for combustion of the fuel.
WINDBOX PRESSURE	The static pressure in the windbox of a burner, firing system or stoker.
WRAPPER SHEET	The outside plate enclosing the firebox in a firebox or locomotive boiler. Also the thinner sheet in the shell of a two thickness boiler drum.
ZONE CONTROL	The control of air flow into individual zones of a stoker.
ZONES	Divisions of the stoker windbox in which air can be maintained at different and controllable pressures.